

REMARKS

Claims 4 and 6-11 are pending. These have been examined and finally rejected as anticipated under 35 USC 102(e) by Fukano et al.

In a bona fide effort to advance prosecution and place this application in condition for allowance, applicant has canceled claims 8, 9 and 11 and amended claim 10 to include the subject matter of claim 8.

According to the present invention, as now amended, as a fastening force is increased by a wedge effect produced by the fastening of the pressing ring, a high contact pressure is respectively generated on: i) a portion (i.e., a primary sealing portion) between a conical tapered face of a projected tip end portion of an inner ring and a face of a cylindrical groove on a side of a joint body which correspond thereto, and ii) a portion (i.e., a secondary sealing portion) between an outer peripheral face of the projected tip end portion of the inner ring and the face of the cylindrical groove on a side of the joint body which corresponds thereto. As a result, the present invention achieves a high sealing property.

Moreover, iii) a sealing portion (i.e., a tertiary sealing portion) is formed between the inner peripheral face of an inner radial side cylindrical portion of the cylindrical groove in the joint body and the outer peripheral face of the cylindrical portion integrally formed with the inner radial side of the projected tip end portion in the inner ring. As a result, the present invention provides a sure sealing property due to the three sealing portions noted .

Furthermore, the present invention has a remarkable advantage wherein an inner radial side cylindrical portion of the cylindrical groove in the joint body is supported and reinforced from the inside thereof by the cylindrical portion integrally formed with the inner radial

side of the projected tip end portion in the inner ring.

In other words, the projected tip end portion of the inner ring engages the cylindrical groove of an inner area of the joint body by screw advancement of the pressing ring, whereby the high surface pressure (i.e., excessive stress) is applied to the portion between the conical tapered face of the projected tip end portion and the face of the cylindrical groove of the joint body which corresponds thereto. Thus, if the high surface pressure is exerted, the inner radial side cylindrical portion of the inner area of the joint body is in a condition wherein it is slightly inclined from a base end portion toward the inner radial side. If there is no cylindrical portion 17 of the inner ring, a temporal creep or a stress relaxation is gradually generated on the portion to which the stress is applied such as the sealing face, or the basal end portion of the inner radial side cylindrical portion, because the material is fluoro-resin, thereby making it possible to surely decrease the seal surface pressure of the secondary sealing portion.

Namely, the cylindrical portion 17 of the inner ring exists, thereby making it possible to prevent the operation wherein the inner radial side cylindrical portion in the inner area of the joint body is slightly inclined from the base end portion to the inner radial side, as soon as possible and surely. Compared with the case that there is no cylindrical portion of the inner ring, the present invention having the cylindrical portion shows that a higher surface pressure can be generated on the portion between the conical tapered face of the projected tip end portion and the face of the cylindrical groove of the joint body which corresponds thereto. Moreover, an existence of the cylindrical portion of the inner ring can delay generation of the temporal creep or the stress relaxation, and decrease the affection thereof, thereby making it possible to maintain the high seal surface pressure for a long time.

Furthermore, owing to the tertiary sealing portion, the fluid such as a liquid medicine flowing in the pipe does not enter a gap or a clearance formed in the joint structure, thereby preventing the fluid from stagnating as much as possible. So, it is applicable to the field such as semiconductor field which does not allow stagnation of the fluid.

Fukano et al either discloses nor suggests the feature of the present invention.

Fukano et al only discloses the pipe joint adopting sealing technique, which is different from the present invention. In other words, Fukano only discloses structure wherein projections 46a to 46c disposed on an outer peripheral face 44 of an expanded section 38 are linearly contacted with a portion between the expanded section 38 of an insert bush 26 and an opening 24 of a joint body 16, so as to perform sealing. So, in the structure of Fukano et al, there is no sealing portion except them (see Col. 6, lines 37-44). Though a third surface 54 of the insert bush 26 is contacted with an inclined surface 52 of the annular projection 34, they do not effect the seal, because the inclined surface 52 of the annular projection 34 has a plurality of grooves 68a to 68c for making the first clearance 50 communicate with the second clearance 56, as shown in Fig. 4. Moreover, as shown in the description of "the inclined surface 52 of the annular projection 34 of the joint body 16 functions as a stopper for restricting the terminal end of the displacement portion of the insert bush 26" (see Col. 5, lines 42-45), the function as the sealing portion is not expected. Furthermore, compared with the tertiary sealing portion of the present invention, we note that description of Fukano et al, "a fifth surface 64 which is formed in a non-contact state with respect to a wall surface 60 of the annular projection 34 and which is formed to be substantially parallel to the direction of the axis B of the opening 24" (see Col. 3, line 64 to Col. 4, line 11). That is, a portion between the wall surface 60 and the fifth surface 64 is not a

sealing portion.

Thus, even though the pipe joint of Fukano et al seems structurally similar to the present invention, Fukano et al only discloses the pipe joint including the sealing technique which is completely different from the present invention in function.

In the pipe joint of Fukano et al, there are structurally the first clearance, the second clearance and the third clearance in view of sealing technique. Owing to the third clearance formed between a sixth surface 66 of the expanded section 38 and the range of the annular projection 34, a liquid medicine is poured to the inside of the clearance, thereby surely causing inconvenience, namely, stagnation of the liquid. So, it is not suitable for the semiconductor field.

The pipe joint of Fukano et al is obviously different from the present invention. Moreover, the present invention recites sealing portions not found in or derivable from Fukano et al

The examiner is urged to enter the above amendments to the claims and to allow claims 10 and 4, 6 and 7.

Respectfully submitted,



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MARKED-UP COPY OF CLAIM 10

10. (Amended) A pipe joint made of resin, comprising:

a sleeve-like inner ring which is to be pressingly inserted into one end portion of a pipe member to be integrated with said pipe member under a state where said inner ring is outward protruded in an axial direction from one end portion of said pipe member;

a joint body in which a cylindrical receiving port is formed in one end portion, an insertion portion of said pipe member into which said inner ring is pressingly inserted, being [to be] inserted into said receiving port; and

a pressing ring which is to be screwed to said one end portion of said joint body, presses said inner ring from an outer side of said pipe member by means of screw advancement toward said one end portion of said joint body, to cause a projected tip end portion of said inner ring to abut against an inner area of said receiving port of said joint body, thereby forming a sealing portion, wherein:

an inner radial face of said projected tip end portion of said inner ring is formed as a conical tapered face in which a diameter is larger [as] when further moving toward an outer side in the axial direction of said inner ring,

a cylindrical groove is formed in an inner area of said receiving port of said joint body, said projected tip end portion of said inner ring including said conical tapered face [is to be] being fitted [into] in the axial direction in said cylindrical groove, and said cylindrical groove cooperates with at least one of : [a place of] said conical tapered face and a [place on] a side of an outer radial face of said projected tip end portion, to form said sealing portion, [and]

the inclination angle of said conical tapered face of said projected tip end portion of said inner ring with respect to the axis is set to $5 \pm 20^\circ$ [°], and

a cylindrical portion which abuts against an inner peripheral face of a cylindrical portion on an inner radial side of said cylindrical groove of said joint body is formed integrally with an inner radial side of said projected tip end portion of said inner ring.